Effects of Co-existed Ions on the Inner Structure of Copper Deposited on Zinc Surface from Cupric Sulphate Solution

AUTHOR(S):

Fujihira, Hidekiyo

with the annealing temperature was discussed. Further, the results of various X-ray analyses concerning those items, the fibre structure of several aluminium plates, the change of recrystallization temperature in accordance with purity and the inner structural change due to the annealing, were reported.

In the present research, a more minute X-ray analysis on the inner structural change due to the annealing in polycrystalline aluminium (99.99% in purity) was carried out by the Laue method, utilizing the heterogeneous X-rays emitted from Cu anticathode. The conditions of the specimens used in this experiment were given in the following table (a special technique was adopted to obtain the Laue pattern from the same place of each specimen, and the annealing and the X-ray exposure were alternated).

No. of Specimens	Purity (%)	Pre-annealing	Reduction (%)	Final Thickness (mm)
A	ditto	450°C, 4 hrs.	80	0.20
B	ditto	ditto	95	0.20
C	ditto	ditto	97	0.20

In A and B, the usual recrystallization phenomenon was observed.

In C, one perfect crystal (strain-free) and some imperfect crystals (strain-rich) which had almost the same crystallographic directions, were observed simultaneously at a lower temperature (at 300°C for 10 min.) and besides, the fibrous arragement of recrystallization was observed at 300°C for 2 hrs. The result of Laue pattern obtained at 300°C for 40 hrs. was almost the same with that obtained at 300°C for 10 min., and also the state at 450°C for 6 hrs. was the same with that at 300°C for 2 hrs. The Laue pattern obtained at 600°C for 30 hrs. was almost the same with that obtained from the so-called single crystal and denoted the same crystallographic direction as at 300°C for 10 min.

---

9. Effects of Co-existed Ions on the Inner Structure of Copper Deposited on Zinc Surface from Cupric Sulphate Solution

Hidekiyo Fujihira

(H. Takagi Laboratory)

In this investigation, 18 and 28 weight percent cupric sulphate solution added 0.03~0.10% HCl, CH_3COOH, H_2SO_4, Na_2SO_4, $NaHSO_4$, $ZnSO_4$ and $FeSO_4$, respectively, were used.

The X-ray analysis of metallic copper specimens which were deposited on the surface of zinc clod immeged in the above solution by the difference of the electrolytical solutional tension, was performed by the Laue method, utilizing the heterogenous X-rays emmitted from copper anticathode.

The results thus obtained can be summarised as follows:

(1) Metallic copper deposited from cupric sulphate to which HCl or CH_3COOH was added, were composed of perfectly irregular aggregation of micro-crystals of the diameter 10^{-3}~10^{-4}cm. The higher the acid concentration, the more the porous copper became. When the added constituent was H_2SO_4, porous copper deposited was composed of comparatively large microcrystals of the diameter 10^{-2}~10^{-3}cm.

(2) In the case of addition of sulphates to cupric sulphate solutions, copper closely deposited on the surface of Zinc clod, having some special germs.

The deposited ground copper was composed of irregular aggregations of micro-crystals of 10^{-2}cm. But the germinal copper had fibre structure having one or two axes <110>.

Laue photograph showed that this fibre structure became clear in the order of Na_2SO_4, $ZnSO_4$ and $NaHSO_4$.

(3) Quantity of sulphate added had no influence on the fibre structure, when the concentration of cupric sulphate was constant (18 or 28 percent in weight), while in the case of the constant quantity of sulphate was added, the higher the concentration of the cupric sulphate, the clearer the fibre structure became.

(4) Usually copper deposited from the above solution contained reddish-black Cu_2S, but copper from Fehling's solution did not contain such compound and had some copper germs which might have <110> fibre axis.

---

10. Determination of Density Change of Glass by the Sink-Float Method. (VI)

Change of Density of Glass with Time at Constant Temperature

Masao Mine, Tamotsu Yamate and *Torao Nobusawa*

(Sawai Laboratory)

The flotation method of varying the temperature of bath at a constant rate, which has been used successfully to determine small variations in glass density for chemical composition control in factory practice, was proved to be applicable for studying the configurational change of glass during heat treatment in the annealing range (this Bull, **20** 54, 1950; **24** 71, **25** 62, **26** 70, 1951).

For the density measurement, rod samples of a soda-lime glass (*ibid.* **19** 52, 1949) were treated for various times in a laboratory furnace kept at constant